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# LEVEL II

(13)

M-X

ENVIRONMENTAL

TECHNICAL REPORT

ETR 29
PUBLIC FINANCE MODEL

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Anticipated increases in revenues and expenditures and associated deficits and/or surpluses due to M-X related population in-migration are estimated (1) at an aggregate level for all governmental units within a county area and (2) for the potentially affected school districts within each affected county. In each case, the per capita and/or per pupil rates employed reflect the expenditure and revenue patterns of each jurisdiction as classified by the population size of the particular county area under analysis. Data were obtained from the U.S Bureau of the Census, Census of Governments, 1976/77

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and adjusted to 1980 dollars using the implicit price deflator for state and local government purchases of goods and services (CEA, 1980). The resultant impact estimates are presented in constant 1980 dollars. As the per capita rates used reflect aggregate revenues and expenditures, the estimates presented reflect aggregate levels of revenues and expenditures and should not be interpreted as impacts associated with any specific jurisdiction within the county area under analysis.

The following sections discuss the three modules developed for analyzing the fiscal effects of M-X deployment:

- Local Government Expenditures and Revenue Module
- Education Module
- Capital Expenditure Module

M-X ENVIRONMENTAL TECHNICAL REPORT:
PUBLIC FINANCE MODEL

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22 December 1980

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# LOCAL GOVERNMENT FINANCE MODEL

## 1.0 INTRODUCTION

Anticipated increases in revenues and expenditures and associated deficits and/or surpluses due to M-X related population in-migration are estimated (1) at an aggregate level for all governmental units within a county area and (2) for the potentially affected school districts within each affected county. In each case, the per capita and/or per pupil rates employed reflect the expenditure and revenue patterns of each jurisdiction as classified by the population size of the particular county area under analysis. Data were obtained from the U.S. Bureau of the Census, Census of Governments, 1976/77 and adjusted to 1980 dollars using the implicit price-deflator for state and local government purchases of goods and services (CEA, 1980). The resultant impact estimates are presented in constant 1980 dollars. As the per capita rates used reflect aggregate revenues and expenditures, the estimates presented reflect aggregate levels of revenues and expenditures and should not be interpreted as impacts associated with any specific jurisdiction within the county area under analysis.

As accounting practices vary from county to county, and from state to state, differing line items (expenditures categories and revenue sources) are accounted for in the general fund budgets of each jurisdiction. From an accounting framework, no one model can accurately account for these differences. A model was developed based on expenditure functions (administrative, transportation, public safety, social service, education, environmental services) and revenue sources (local revenues, and intergovernmental revenues) as classified by the Bureau of the Census. The analysis assumes the existing tax rates and structures within each county area to remain constant through the period of analysis. Intergovernmental aid (federal revenue sharing monies, grants-in-aid, in-lieu taxes) are not varied relative to the local jurisdictions so that the potential level of federal assistance required as mitigations could be estimated. Federal and state aid to local school districts, however, have been included in the analysis. In all cases the tax expenditure estimates presented assume that service standard levels will not degrade throughout the period of analysis.

In addition, each expenditure function and revenue source within each jurisdiction is affected in varying degrees by the type of in-migrating population group that is anticipated in the area—construction workers residing in construction camps, military personnel housed on base, and community-based populations. While the community-based population in-migration will affect each expenditure function and revenue source as determined by the specific per capita rate for each category under analysis, the military personnel and construction workers will exert differing influences due to their particular residence and consumption patterns. These differences are reflected in the revenue and expenditure equations by adjustments to the per capita rates based on anticipated effects these population groups will have upon the particular expenditure function and revenue source under analysis.

The following sections discuss the three modules developed for analyzing the fiscal effects of M-X deployment:

o    Local Government Expenditures and Revenue Module

o    Education Module

o    Capital Expenditure Module

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## 2.0 LOCAL GOVERNMENT EXPENDITURE AND REVENUE MODULE

### 2.1 INTRODUCTION

The Local Government Module estimates the aggregate expenditures and revenues of the potentially affected local governmental units (county, city, school district, special district) within a county area by major expenditure functions and revenue sources for each county area for the period 1982-1994. Section 2.2 presents the algorithm used in the analysis and the variable definitions. The following discussion presents the assumptions and a general description of the particular expenditure categories and revenue sources that comprise the Local Government Module.

### Administrative Expenditures (2.1.1)

As the population and community expands within each potentially affected county area, administrative outlays for new staff, equipment, and other related expenses are assumed to increase in direct proportion to the community-based population. Increased administrative outlays are calculated by multiplying the per capita administrative rates (Tables 2.1.1-1 and 2.1.1-2) by the community-based population for each county area under analysis. Construction camp based and onbase military personnel are assumed to contribute negligible demands for this service and are not included in the calculations.

### Public Safety (2.1.2)

Police and fire protection services required and the attendant increases in operation and maintenance costs are calculated to expand in direct proportion to the increased community-based population and the temporary construction work force. Onbase military personnel and dependents are expected to demand a diminished level of service and thus the per capita rate applied against this population group is assumed to be 70 percent less to reflect their particular residence pattern. The per capita public safety rates used in the analysis are presented in Tables 2.1.1-1 and 2.1.1-2.

### Social Service Expenditures (2.1.3)

Increased social service expenditures (hospital, health and public welfare) are calculated by applying the per capita social service expenditure rates (Tables 2.1.1-1 and 2.1.1-2) against community-based population in-migration and construction work force in-migration. Health facilities will be provided for military personnel and thus health service demands were not calculated for this population group.

### Environmental Service Expenditures (2.1.4)

Increased infrastructure development (sewage, solid waste, parks and recreation) will require increased maintenance and operation costs in direct proportion to the level of the in-migrating community-based population. As facilities required for the military personnel will be provided by the federal government, increased maintenance and operation costs are calculated for the community-based population only. The per capita environmental service rates are presented in Tables 2.1.1-1 and 2.1.1-2.

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Table 2.1.1-1. Local government model, per capita rates for Nevada/Utah counties[1] (1980 dollars).

| CATEGORY / COUNTY | PROPERTY TAX REVENUES (PCPRPTX) | OTHER TAX REVENUES (PCOTTX) | SERVICE CHARGES REVENUES (PCSERV) | INTER-GOVERNMENT TRANSFERAL REVENUES (PCIGREV) | ADMINISTRATION EXPENSES (PCADM) | PUBLIC SAFETY EXPENSES (PCPS) | SOCIAL SERVICE EXPENSES (PCSOC) | TRANS-PORTATION EXPENSES (PCTRANS) | EDUCATION EXPENSES (PCEDUC) | ENVIRONMENTAL SERVICE EXPENSES (PCENVIR) | MISCEL-LANEOUS EXPENSES (PCMISC) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Beaver, UT. | 283.6 | 44.8 | 143.8 | 389.1 | 43.5 | 47.5 | 69.9 | 67.3 | 519.7 | 50.1 | 63.3 |
| Clark, NV. | 337.7 | 189.9 | 274.4 | 418.1 | 89.7 | 145.1 | 138.5 | 73.9 | 514.4 | 126.6 | 137.2 |
| Eureka, NV. | 321.8 | 100.2 | 274.4 | 354.8 | 84.4 | 102.9 | 120.0 | 75.2 | 465.6 | 75.2 | 127.9 |
| Iron, UT. | 275.7 | 58.0 | 149.0 | 424.7 | 39.6 | 60.7 | 47.5 | 76.5 | 581.7 | 87.1 | 54.1 |
| Juab, UT. | 283.6 | 44.8 | 143.8 | 389.1 | 43.5 | 47.5 | 69.9 | 67.3 | 519.7 | 50.1 | 63.3 |
| Lincoln, NV. | 321.8 | 100.2 | 274.4 | 354.8 | 84.4 | 102.9 | 120.0 | 75.2 | 465.6 | 75.2 | 127.9 |
| Millard, UT. | 283.6 | 44.8 | 143.8 | 389.1 | 43.5 | 47.5 | 69.9 | 67.3 | 519.7 | 50.1 | 63.3 |
| Nye, NV. | 321.8 | 100.2 | 274.4 | 354.8 | 84.4 | 102.9 | 120.0 | 75.2 | 465.6 | 75.2 | 127.9 |
| Salt Lake, UT. | 248.0 | 60.7 | 120.0 | 398.3 | 44.8 | 79.1 | 25.1 | 52.8 | 486.7 | 64.6 | 87.1 |
| Utah, UT. | 248.0 | 60.7 | 120.0 | 398.3 | 44.8 | 79.1 | 25.1 | 52.8 | 486.7 | 64.6 | 87.1 |
| Washington, UT. | 283.6 | 44.8 | 143.8 | 389.1 | 43.5 | 47.5 | 69.9 | 67.3 | 519.7 | 50.1 | 63.3 |
| White Pine, NV. | 222.9 | 15.8 | 220.3 | 397.0 | 85.7 | 69.9 | 164.9 | 85.7 | 386.5 | 29.0 | 36.9 |

[1] All per capita rates are considered constant for the period 1982-1994.

Source: 1977 Census of Governments, Compendium of Government Finances, U.S. Department of Commerce, Bureau of the Census.

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Table 2.1.1-2. Local government model, per capita rates for Texas/New Mexico counties[1] (1980 dollars).

| CATEGORY COUNTY | PROPERTY TAX REVENUES (PCPRPTX) | OTHER TAX REVENUES (PCOTTX) | SERVICE CHARGES REVENUES (PCSERV) | INTER-GOVERNMENT TRANSFERAL REVENUES (PCIGREV) | ADMINISTRATION EXPENSES (PCADM) | PUBLIC SAFETY EXPENSES (PCPS) | SOCIAL SERVICE EXPENSES (PCSOC) | TRANS-PORTATION EXPENSES (PCTRANS) | EDUCATION EXPENSES (PCEDUC) | ENVIRONMENTAL SERVICE EXPENSES (PCENVIR) | MISCEL-LANEOUS EXPENSES (PCMISC) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Baily, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Castro, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Chaves, N.M. | 126.6 | 34.3 | 149.0 | 518.4 | 33.0 | 59.4 | 55.4 | 44.8 | 503.9 | 65.9 | 71.2 |
| Cochran, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Curry, N.M. | 81.8 | 18.5 | 50.1 | 480.1 | 21.1 | 60.7 | 2.6 | 43.5 | 436.6 | 58.0 | 26.4 |
| Dallam, TX. | 230.0 | 74.1 | 79.7 | 289.5 | 60.6 | 59.5 | 1.1 | 52.7 | 457.8 | 42.6 | 28.0 |
| Deaf Smith, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| De Baca, N.M. | 102.9 | 22.4 | 92.3 | 548.7 | 35.6 | 51.4 | 36.9 | 47.5 | 503.9 | 44.8 | 46.2 |
| Hale, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Harding, N.M. | 102.9 | 22.4 | 92.3 | 548.7 | 35.6 | 51.4 | 36.9 | 47.5 | 503.9 | 44.8 | 46.2 |
| Hartley, TX. | 314.2 | 38.1 | 33.7 | 120.1 | 50.5 | 18.0 | 0.0 | 71.8 | 329.9 | 0.0 | 35.9 |
| Hockley, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Lamb, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Lea, N.M. | 102.9 | 22.4 | 92.3 | 548.7 | 35.6 | 51.4 | 36.9 | 47.5 | 503.9 | 44.8 | 46.2 |
| Lubbock, TX. | 286.1 | 44.9 | 167.2 | 309.7 | 43.8 | 60.6 | 57.2 | 67.3 | 430.8 | 66.2 | 72.9 |
| Moore, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Oldham, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Parmer, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Potter Randall, TX. | 286.1 | 44.9 | 167.2 | 309.7 | 43.8 | 60.6 | 57.2 | 67.3 | 430.8 | 66.2 | 72.9 |
| Quay, N.M. | 102.9 | 22.4 | 92.3 | 548.7 | 35.6 | 51.4 | 36.9 | 47.5 | 503.9 | 44.8 | 46.2 |
| Roosevelt, N.M. | 126.6 | 34.3 | 149.0 | 518.4 | 33.0 | 59.4 | 55.4 | 44.8 | 503.9 | 65.9 | 71.2 |
| Sherman, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Swisher, TX. | 246.8 | 37.0 | 157.1 | 309.7 | 33.7 | 34.8 | 76.3 | 50.5 | 430.8 | 72.9 | 52.7 |
| Union, N.M. | 102.9 | 22.4 | 92.3 | 548.7 | 35.6 | 51.4 | 36.9 | 47.5 | 503.9 | 44.8 | 46.2 |

[1]All per capita rates are considered constant for the period 1982-1994.

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## Transportation Expenditures  (2.1.5)

Provision and maintenance of highway facilities, county roads, and city streets are calculated by directly multiplying the per capita transportation rates (Table 2.1.1-1 and 2.1.1-2) by the community-based population in-migration. Construction worker population in-migration and Air Force population in-migration residing onbase are expected to demand a diminished level of service and thus the per capita rate applied against these two population groups is assumed to be 70 percent less to reflect their particular residence pattern.

## Educational Service Expenditures  (2.1.6)

Educational service outlays are calculated by multiplying total pupils associated with total population in-migration (community, construction and Air Force population) by educational expenditures per pupil. Per pupil rates are presented in Section 3, Table 3.1.1-1 and Table 3.1.1-2. The estimates presented assume that service standard levels (pupil/teacher) ratios remain constant throughout the period of analysis.

## Miscellaneous Expenditures  (2.1.7)

Increased miscellaneous outlays are calculated by applying the miscellaneous expenditures per capita (Table 2.1.1-1 and 2.1.1-2) to the community-based population in-migration. Construction camp based and onbase personnel are expected to contribute negligible demands and are not included in the calculations.

## Property Tax Revenues  (2.1.8)

Increased property tax revenues are calculated by applying the community-based population in-migration directly to the property tax revenues per capita. These revenues have been lagged one year. Construction camp based and military personnel living on-base are not assumed to contribute to this revenue source. The per capita property tax rates used in the analysis are presented in Tables 2.1.1-1 and 2.1.1-2.

## Other Tax Revenues  (2.1.9)

Other tax revenues (sales, income, other) are anticipated to rise in direct proportion to the community-based population in-migration. Construction worker population in-migration, however, will have a greater effect upon other tax revenues due to their higher incomes and differing consumption patterns. Per capita rates were adjusted upward by 16 percent to reflect their differing consumption patterns (Construction Worker Profile, Old West Regional Commission, 1975). Military personnel and their dependents will have the use of base facilities, thus the contribution of Air Force population will be less than the other in-migrating population groups. Thus, the per capita rates employed are assumed to be 75 percent less. The per capita rates for other tax revenues are presented in Tables 2.1.1-1 and 2.1.1-2.

## Service Charge Revenues  (2.1.10)

Service charges (licenses, permits, fines and fees) are calculated by directly applying the service charge revenues per capita rate (Tables 2.1.1-1 and 2.1.1-2)

against the community-based population in-migration. Air Force population in-migration living onbase and construction worker population in-migration, due to their residence patterns, also contribute to service charges but to a lesser extent. Per capita rates applied to these populations are assumed to be 75 percent less to reflect the particular residence characteristics.

## Intergovernmental Revenues  (2.1.11)

Intergovernmental revenues (grants-in-aid, revenue sharing monies, in-lieu taxes) are assumed to be not available to the local jurisdictions. Revenues generated from state and federal sources for educational support, however, have been included in the analysis. Federal monies under P.L. 81-874 have been allocated for the number of school age military dependents who live onbase (3A pupils); the number of school age dependents of both military and civilian personnel who work onbase and reside in the community (3B pupils); and the number of school age dependents of construction worker population employed on a federal project (3C pupils). The revenues are calculated by multiplying the respective pupil categories by $872 per pupil (3A pupils), $436 per pupil (3B pupils), and $392 per pupil (3C pupils) respectively.

It is anticipated that grants-in-aid, revenue sharing monies, and in-lieu taxes will be available to local governmental jurisdictions at levels above current levels. These intergovernmental transfers would form a major source of mitigations. The actual levels of such funding will be negotiated by state and local agencies on the one hand and representatives of the federal government on the other hand. More detailed and jurisdiction-specific analyses will be prepared in close cooperation with all potentially affected governmental bodies. The methodology reported here supports a more general analysis for the EIS that allows comparison of various alternatives.

## 2.2  LOCAL GOVERNMENT EXPENDITURE AND REVENUE MODULE: ALGORITHMS AND DEFINITIONS

### Output Variables  (2.2.1)

#### EXPENDITURES

$$ADM_{ij} = PCADM_{ij} * CMPOP_{ij}$$

$$PS_{ij} = (PCPS_{ij} * CCPOP_{ij}) + (PCPS_{ij} * CMPOP_{ij}) + (PCPS_{ij} * AFPOP_{ij} * WEIGHT\ 1)$$

$$SOC_{ij} = (PCSOC_{ij} * CMPOP_{ij}) + (PCSOC_{ij} * CCPOP_{ij})$$

$$ENVIR_{ij} = PCENVIR_{ij} * CMPOP_{ij}$$

$$TRANS_{ij} = (PCTRANS_{ij} * CMPOP_{ij}) + (PCTRANS_{ij} * CCPOP_{ij} * WEIGHT\ 1) + (PCTRANS_{ij} * AFPOP_{ij} * WEIGHT\ 1)$$

$$EDUC_{ij} = PUP_{ij} * PPEXP_{ij}$$

$$\text{MISC}_{ij} = \text{PCMISC}_{ij} * \text{CMPOP}_{ij}$$

$$\text{TTEXP}_{ij} = \text{ADM}_{ij} + \text{PS}_{ij} + \text{SOC}_{ij} + \text{ENVIR}_{ij} + \text{TRANS}_{ij} + \text{EDUC}_{ij} + \text{MISC}_{ij}$$

$$\text{BTEXP}_{ij} = (\text{PCADM}_{ij} + \text{PCPS}_{ij} + \text{PCSOC}_{ij} + \text{PCENVIR}_{ij} + \text{PCTRANS}_{ij} + \text{PCEDUC}_{ij} + \text{PCMISC}_{ij}) * \text{BPOP}_{ij}$$

## REVENUES

$$\text{PRPTX}_{ij} = \text{PCPRPTX}_{i,j-1} * \text{CMPOP}_{i,j-1}$$

$$\text{OTTX}_{ij} = (\text{PCOTTX}_{ij} * \text{CMPOP}_{ij}) + (\text{PCOTTX}_{ij} * \text{CCPOP}_{ij} * \text{WEIGHT 2}) + (\text{PCOTTX}_{ij} * \text{AFPOP}_{ij} * \text{WEIGHT 3})$$

$$\text{SERV}_{ij} = (\text{PCSERV}_{ij} * \text{CMPOP}_{ij}) + (\text{PCSERV}_{ij} * \text{CCPOP}_{ij} * \text{WEIGHT3}) + (\text{PCSERV}_{ij} * \text{AFPOP}_{ij} * \text{WEIGHT3})$$

$$\text{ZLOCREV}_{ij} = \text{PRPTX}_{ij} + \text{OTTX}_{ij} + \text{SERV}_{ij}$$

$$\text{ZIGREV}_{ij} = (\text{PPREVS}_{ij} * \text{PUP}_{ij}) + (\text{ASTUDT} * \text{PUPM}_{ij}) + (\text{BSTUDT} * \text{PUPC}_{ij}) + (\text{CSTUDT} * \text{PUPCC}_{ij})$$

$$\text{TTREV}_{ij} = \text{ZLOCREV}_{ij} + \text{ZIGREV}_{ij}$$

$$\text{ZIMP}_{ij} = \text{TTREV}_{ij} - \text{TTEXP}_{ij}$$

$$\text{BTREV}_{ij} = (\text{PCPRPTX}_{ij} + \text{PCOTTX}_{ij} + \text{PCSERV}_{ij} + \text{PCIGREV}_{ij}) * \text{BPOP}_{ij}$$

where:

$\text{ADM}_{ij}$ = M-X related administrative expenditures for county i, year j.

$\text{BTEXP}_{ij}$ = Total baseline expenditures for county i, year j.

$\text{BTREV}_{ij}$ = Total baseline revenues for county i, year j.

$\text{EDUC}_{i}$ = M-X related education expenditures for county i, year j.

$\text{ENVIR}_{ij}$ = M-X related environmental service expenditures (sewerage, natural resources, parks and recreation) for county i, year j.

$\text{MISC}_{ij}$ = M-X related miscellaneous expenditures for county i, year j.

$\text{OTTX}_{ij}$ = M-X related other tax revenues (sales, income, other) for county i, year j.

$\text{PRPTX}_{ij}$ = M-X related property tax revenues for county i, year j.

$\text{PS}_{ij}$ = M-X related public safety expenditures for county i, year j.

$SERV_{ij}$ = M-X related service charges and miscellaneous revenues for county i, year j.

$SOC_{ij}$ = M-X related social service expenditures (public welfare, hospital, health) for county i, year j.

$TRANS_{ij}$ = M-X related transportation expenditures (highways and streets) for county i, year j.

$TTEXP_{ij}$ = M-X related total expenditures for county i, year j.

$TTREV_{ij}$ = M-X related total, all revenues, for county i, year j.

$ZIGREV_{ij}$ = M-X related intergovernmental revenue contributions, state and federal, for county i, year j.

$ZIMP_{ij}$ = M-X related total net impact, surplus or deficit, for county i, year j.

$ZLOCREV_{ij}$ = M-X related total, all local revenues, for county i, year j.

## Input Data  (2.2.2)

$AFPOP_{ij}$ = Air Force population in-migration, residing onbase, for county i, year j.

$ASTUDT$ = Educational revenues per pupil from Public Law 81-874, associated with military school age dependents residing onbase ($872 per pupil).

$BPOP_{ij}$ = Baseline population in county i, year j.

$BSTUDT$ = Educational revenues per pupil from Public Law 81-874, associated with military school age dependents and civilian operations workers' school age dependents residing in the community ($436 per pupil).

$CCPOP_{ij}$ = Construction worker population in-migration, residing both in construction camps and onbase, for county i, year j.

$CMPOP_{ij}$ = Community based population in-migration for county i, year j.

$CSTUDT$ = Educational revenues per pupil from Public Law 81-874, associated with school age dependents of base construction and shelter construction worker population in-migration ($392 per pupil).

$PCADM_{ij}$ = Administration expenditures, per capita, for county i, year j.

$PCEDUC_{ij}$ = Education expenditures, per capita, for county i, year j.

$PCENVIR_{ij}$ = Environmental service expenditures (sewerage, parks and recreation, natural resources) per capita, for county i, year j.

$PCIGREV_{ij}$ = Intergovernmental revenues (state and federal contributions) per capita, for county i, year j.

$PCMISC_{ij}$ = Miscellaneous expenditures, per capita, for county i, year j.

$PCOTTX_{ij}$ = Other tax revenues (sales, income, other) per capita, for county i, year j.

$PCPRPTX_{ij}$ = Property tax revenues, per capita, for county i, year j.

$PCSERV_{ij}$ = Service charges and miscellaneous revenue, per capita, for county i, year j.

$PCSOC_{ij}$ = Social Service expenditures (health, hospital, public welfare), per capita, for county i, year j.

$PCPS_{ij}$ = Public Safety expenditures (police, fire, correction), per capita, for county i, year j.

$PCTRANS_{ij}$ = Transportation expenditures (highways, streets), per capita, for county i, year j.

$PPEXP_{ij}$ = Education expenditures, per pupil, for county i, year j.

$PPREVS_{ij}$ = Educational revenues per pupil, state contributions, for county i, year j.

$PUP_{ij}$ = Total pupils associated with total population in-migration for county i, year j.

$PUPC_{ij}$ = Pupils of military personnel, and civilian operations workers' school age dependents residing in the community, for county i, year j.

$PUPCC_{ij}$ = Pupils of base construction and shelter construction worker population in-migration, residing in the community, for county i, year j.

$PUPM_{ij}$ = Pupils of military personnel, residing onbase, for county i, year j.

WEIGHT 1 = Weighting factor reflecting decreased level of public service demands associated with Air Force population in-migration residing onbase, and construction worker population in-migration residing in construction camps. These population groups are assumed to demand 70 percent less of the services normally demanded by community based population in-migration for services such as public safety and transportation related items.

WEIGHT 2    =    Weighting factor (16 percent) reflecting increased level of consumption demand associated with construction worker population in-migration. The factor is applied against the construction worker in-migration when calculating their influence on increased local tax payments (other than property taxes).

WEIGHT 3    =    Weighting factor (25 percent) reflecting decreased service change revenues associated with Air Force population in-migration residing onbase and construction worker population in-migration, residing in construction camps. This factor is also used in reducing the military personnel's influences on other tax revenues (tax revenues other than property taxes).

## 3.0 EDUCATION MODULE

### 3.1 INTRODUCTION

The Education Module estimates the aggregate expenditures and revenues of the potentially affected school districts for each county area from 1982 through 1994. Section 3.2 presents the algorithm used in the analysis and the variable definitions. The following discussion presents the assumptions and a general description of the expenditure and revenue categories that comprise the Education Module.

#### Revenues (3.1.1)

Total baseline revenues are calculated as the sum of baseline state and federal educational revenue contributions and local educational revenues. State and federal revenues are determined by multiplying the state (includes the federal contribution) educational revenues per pupil for each county directly by the number of baseline pupils. Baseline local educational revenues are derived from the per capita local education revenues multiplied by baseline population. The local per capita and per pupil rates are presented in Tables 3.1.1-1 and 3.1.1-2.

Revenues accruing to the local school districts due to M-X activities are calculated for the three primary sources available--federal aid (P.L. 81-874), state aid, and local sources.

Federal education revenue contributions are mandated through Public Law 81-874 which provides impact funds for dependents of federal employees attending public schools. These monies are allocated for the number of schoolage military dependents who live onbase (3A pupils); the number of schoolage dependents of both military and civilian personnel who work onbase and reside in the community (3B pupils); and the number of schoolage dependents of construction workers employed on a federal project (3C pupils). Revenues are determined by multiplying the respective pupil category by $872 per pupil (3A pupils), $436 per pupil (3B pupils), and $392 per pupil (3C pupils), respectively.

State sources are calculated by multiplying the total number of additional pupils generated by M-X by the state revenues per pupil rate as presented in Tables 3.1.1-1 and 3.1.1-2.

Local educational revenues are a sum of related tax collections (sales, property, motor vehicle), thus the per capita local educational revenue is multiplied directly by the population groups expected to create fiscal impacts. This revenue source has been lagged one year.

#### Expenditures (3.1.2)

Total educational expenditures are calculated as the sum of baseline expenditures plus total M-X impacts (direct and indirect). Total baseline and M-X impact expenditures are derived by directly multiplying the total per pupil educational expenditure rate with total baseline pupils for the former and with pupils associated with total population in-migration for the latter. The per pupil rates used in the analysis are presented in Tables 3.1.1-1 and 3.1.1-2.

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Table 3.1.1-1.    Education module, per capita, and per
                  pupil rates for Nevada/Utah counties
                  (FY 1980 dollars).[1]

| COUNTY | CATEGORY | | |
| | TOTAL EXPENDITURES PER PUPIL (PPEXP) | STATE REVENUES PER PUPIL (PPREVS) | LOCAL REVENUES PER CAPITA (PCREVL) |
|---|---|---|---|
| Beaver, UT | 2,062 | 1,076 | 252 |
| Clark, NV | 2,238 | 1,362 | 212 |
| Eureka, NV | 2,238 | 1,362 | 212 |
| Iron, UT | 2,062 | 1,076 | 252 |
| Juab, UT | 2,062 | 1,076 | 252 |
| Lincoln, NV | 2,238 | 1,362 | 212 |
| Millard, UT | 2,062 | 1,076 | 252 |
| Nye, NV | 2,238 | 1,362 | 212 |
| Salt Lake, UT | 2,062 | 1,076 | 252 |
| Utah, UT | 2,062 | 1,076 | 252 |
| Washington, UT | 2,062 | 1,076 | 252 |
| White Pine, NV | 2,238 | 1,362 | 212 |

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[1]All per capita and pupil rates are considered constant
for the period 1982-1994.

Source:   U.S. Department of Commerce, 1977, Census of Governments,
          Finances of School Districts.

Table 3.1.1-2. Education module, per capita, and per pupil rates for Texas/New Mexico counties (FY 1980 dollars).[1]

| COUNTY | CATEGORY | | |
|---|---|---|---|
| | TOTAL EXPENDITURES PER PUPIL (PPEXP) | STATE REVENUES PER PUPIL (PPREVS) | LOCAL REVENUES PER CAPITA (PCREVL) |
| Bailey, TX | 1,767 | 939 | 208 |
| Castro, TX | 1,767 | 939 | 208 |
| Chaves, NM | 2,022 | 1,630 | 96 |
| Cochran, TX | 1,767 | 939 | 208 |
| Curry, NM | 2,022 | 1,630 | 96 |
| Dallam, TX | 1,767 | 939 | 208 |
| Deaf Smith, TX | 1,767 | 939 | 208 |
| De Baca, NM | 2,022 | 1,630 | 96 |
| Hale, TX | 1,767 | 939 | 208 |
| Harding, NM | 2,022 | 1,630 | 96 |
| Hartley, TX | 1,767 | 939 | 208 |
| Hockley, TX | 1,767 | 939 | 208 |
| Lamb, TX | 1,767 | 939 | 208 |
| Lea, NM | 2,022 | 1,630 | 96 |
| Lubbock, TX | 1,767 | 939 | 208 |
| Moore, TX | 1,767 | 939 | 208 |
| Oldham, TX | 1,767 | 939 | 208 |
| Parmer, TX | 1,767 | 939 | 208 |
| Potter/Randall, TX | 1,767 | 939 | 208 |
| Quay, NM | 2,022 | 1,630 | 96 |
| Roosevelt, NM | 2,022 | 1,630 | 96 |
| Sherman, TX | 1,767 | 939 | 208 |
| Swisher, TX | 1,767 | 939 | 208 |
| Union, NM | 2,022 | 1,630 | 96 |

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[1]All per capita and per pupil rates are considered constant for the period 1982-1994.

Source: U.S. Department of Commerce, 1977 Census of Governments, Finances of School Districts.

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## 3.2 SCHOOL DISTRICT/COUNTY SPECIFIC EDUCATION ALGORITHM AND VARIABLE DEFINITIONS

Output Variables 1 (3.2.1)

### BASELINE REVENUE

$$BSREV_{ij} = BPUP_{ij} * PPREVS_{ij}$$

$$BLREV_{ij} = BPOP_{ij} * PCREVL_{ij}$$

$$BTTREV_{ij} = BSREV_{ij} + BLREV_{ij}$$

### M-X REVENUE

$$PFED_{ij} = (ASTUDT * PUPM_{ij}) + (BSTUDT * PUPC_{ij}) + (CSTUDT * PUPCC_{ij})$$

$$STATE_{ij} = PPREVS_{ij} * PUP_{ij}$$

$$LOCAL_{ij} = PCREVL_{i,j-1} * CMPOP_{i,j-1}$$

$$TOTAL_{ij} = PFED_{ij} + STATE_{ij} + LOCAL_{ij}$$

### TOTAL REVENUE

$$TOTREV_{ij} = BTTREV_{ij} + TOTAL_{ij}$$

### EXPENDITURES

$$BTTEXP_{ij} = BPUP_{ij} * PPEXP_{ij}$$

$$ZMXEXP_{ij} = PUP_{ij} * PPEXP_{ij}$$

$$TOTEXP_{ij} = BTTEXP_{ij} + ZMXEXP_{ij}$$

### NET IMPACT

$$BMPACT_{ij} = BTTREV - BTTEXP_{ij}$$

$$ZMPACT_{ij} = TOTAL_{ij} - ZMXEXP_{ij}$$

$$TOTIMP_{ij} = BMPACT_{ij} + ZMPACT_{ij}$$

---

1. All school districts are considered as county school districts except for Curry County, New Mexico, designated as Clovis Independent School District and Dallam and Hartley counties in Texas, designated as Dalhart Independent School District.

where:

| | | |
|---|---|---|
| BLREV$_{ij}$ | = | Baseline local educational revenue contributions for county i, year j. |
| BMPACT$_{ij}$ | = | Total educational baseline impact (surplus or deficit) for county i, year j. |
| BSREV$_{ij}$ | = | Baseline state and federal educational revenues contributions for county i, year j. |
| BTTREV$_{ij}$ | = | Total baseline educational revenues for county i, year j. |
| BTTEXP$_{ij}$ | = | Total baseline educational expenditures for county i, year j. |
| LOCAL$_{ij}$ | = | Local education (M-X-induced) revenue contributions, county i, year j. |
| PFED$_{ij}$ | = | Educational revenue contributions from the federal government associated with Public Law 81-874 for county i, year j. |
| STATE$_{ij}$ | = | State education (M-X-induced) revenue contributions, county i, year j. |
| TOTAL$_{ij}$ | = | Total education revenues (M-X-induced) federal, state, and local contributions, county i, year j. |
| TOTEXP$_{ij}$ | = | Total, all educational expenditures, baseline plus M-X induced expenditures for county i, year j. |
| TOTIMP$_{ij}$ | = | Total, all educational impacts, baseline plus M-X impacts for county i, year j. |
| TOTREV$_{ij}$ | = | Total, all educational revenues, baseline plus M-X-induced revenues for county i, year j. |
| ZMPACT$_{ij}$ | = | Total educational M-X-induced impacts for county i, year j. |
| ZMXEXP$_{ij}$ | = | Total M-X-induced educational expenditures for county i, year j. |

Input Data (3.2.2)

| | | |
|---|---|---|
| AFPOP$_{ij}$ | = | Air Force population in-migration, residing onbase, for county i, year j. |
| ASTUDT | = | Educational revenues per pupil from Public Law 81-874 associated with military school age dependents residing onbase ($872 per pupil). |
| BPOP$_{ij}$ | = | Baseline population in county i, year j. |

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$BPUP_{ij}$ = Baseline pupils in county i, year j.

BSTUDT = Educational revenues per pupil from Public Law 81-874 associated with military school age dependents and civilian operations workers' school age dependents residing in the community ($436 per pupil).

$CMPOP_{ij}$ = Community based population in-migration for county i, year j.

CSTUDT = Educational revenues per pupil from Public Law 81-874 associated with school age dependents of base and shelter construction worker population in-migration ($392 per pupil).

$PCREVL_{ij}$ = Educational revenues per pupil, local contributions, for county i, year j.

$PPEXP_{ij}$ = Educational expenditures per pupil for county i, year j.

$PPREVS_{ij}$ = Educational revenues per pupil, state contributions, for county i, year j.

$PUP_{ij}$ = Total pupils associated with total population in-migration for county i, year j.

$PUPC_{ij}$ = Pupils of military personnel, residing offbase, and civilian operations workers' school age dependents for county i, year j.

$PUPCC_{ij}$ = Pupils of base and shelter contruction worker population in-migration residing in the community, for county i, year j.

$PUPM_{ij}$ = Pupils of military personnel, residing onbase, for county i, year j.

## 4.0 CAPITAL EXPENDITURE MODULE

### 4.1 MODEL STRUCTURE AND DESCRIPTION

Nine categories of capital expenditure requirements for local governments in the deployment areas are estimated. These expenditures are for police, fire, general government, health care, library, street, wastewater, water distribution, and educational service facilities. In each case these costs are derived from estimates of the related investment in each region of analysis. All capital requirements are presented in 1980 dollars. Table 4-1 presents the factors that determine the specific capital investment requirements. Additionally, the estimates for health service facility investments costs are reduced by 70 percent to reflect the probability that this portion of the related investment costs will be provided by private concerns. Likewise, the street and transportation system investment costs are reduced to 77 percent of the total investment requirements to reflect the fact that private developers will pay for the initial capital costs for providing the minor streets that serve residential and some commercial areas. The estimates presented assume a linear relationship through time for all capital expenditures. Some economies of scale may exist for certain expenditures but this concern has not been addressed. In addition, many of the peak year demands could be supplied by temporary facilities which could reduce the peak year costs substantially. The estimates presented basically reflect average costs which assume that service standard levels are not allowed to deteriorate to substandard levels.

### 4.2 ALGORITHM AND VARIABLE DEFINITION

Public Facilities

$$POLFAC_{ij} = CMPOP_{ij} * PCPOL_{ij}$$

$$FREFAC_{ij} = CMPOP_{ij} * PCFRE_{ij}$$

$$ADMFAC_{ij} = CMPOP_{ij} * PCADM_{ij}$$

$$HLTHFAC_{ij} = CMPOP_{ij} * PCHLTH_{ij} * Weight\ A$$

$$LIBFAC_{ij} = CMPOP_{ij} * PCLIB_{ij}$$

Street System

$$ART_{ij} = ARTL_{ij} * ARTCST_{ij}$$

$$COL_{ij} = COLL_{ij} * COLCST_{ij}$$

Utilities

$$RSS_{ij} = SFU_{ij} * SFUCS_{ij} + MFU_{ij} * MFUCS_{ij} + MHU_{ij} * MHUCS_{ij}$$

$$RWTR_{ij} = SFU_{ij} * SFUCW_{ij} + MFU_{ij} * MFUCW_{ij} + MHU_{ij} * MHUCW_{ij}$$

$$NRSS_{ij} = RSS_{ij} * Weight\ B$$

$$NRWTR_{ij} = RWTR_{ij} * \text{Weight C}$$

$$SWSS_{ij} = (RSS_{ij} + NRSS_{ij}) * \text{Weight D}$$

$$SWWTR_{ij} = (RWTR_{ij} + NRWTR_{ij}) * \text{Weight E}$$

$$TOTUTL_{ij} = RSS_{ij} + RWTR_{ij} + NRSS_{ij} + NRWTR_{ij} + SWSS_{ij} + SWWTR_{ij}$$

Schools

$$EDFAC_{ij} = PUP_{IJ} * SFPUP_{ij} * CSTSF_{ij}$$

where,

| | | |
|---|---|---|
| $ADMFAC_{ij}$ | = | Costs for general administrative facilities, county i, year j. |
| $ART_{ij}$ | = | Arterial street costs, county i, year j. |
| $ARTCST_{ij}$ | = | Cost per linear foot, arterials, county i, year j. |
| $ARTL_{ij}$ | = | Length of arterial streets required, linear feet, county i, year j. |
| $COL_{ij}$ | = | Collector street costs, county i, year j. |
| $COLCST_{ij}$ | = | Cost per linear foot, collectors, county i, year j. |
| $COLL_{ij}$ | = | Length of collector streets required, linear feet, county i, year j. |
| $CMPOP_{ij}$ | = | Community based population in-migration, county i, year j. |
| $CSTSF_{ij}$ | = | Cost per foot, school facilities, county i, year j. |
| $EDFAC_{ij}$ | = | Educational facility development cost, county i, year j. |
| $FREFAC_{ij}$ | = | Costs for fire protection facilities, county i, year j. |
| $HLTHFAC_{ij}$ | = | Costs for health care facilities, county i, year j. |
| $LIBFAC_{ij}$ | = | Costs for library facilities, county i, year j. |
| $POLFAC_{ij}$ | = | Costs for police facilities, county i, year j. |
| $MFU_{ij}$ | = | Multiple family units required, county i, year j. |
| $MHU_{ij}$ | = | Mobile home units required, county i, year j. |
| $MFUCS_{ij}$ | = | Cost for sanitary sewage facilites per multiple family unit, county i, year j. |
| $MUFCW_{ij}$ | = | Cost for water facility system per multiple family unit, county i, year j. |

| | | |
|---|---|---|
| $MHUCS_{ij}$ | = | Cost for sanitary sewage facilities per mobile home unit, county i, year j. |
| $MHUCW_{ij}$ | = | Cost for water facility system per mobile home unit, county i, year j. |
| $SFU_{ij}$ | = | Single family units required, county i, year j. |
| $SFUCS_{ij}$ | = | Cost for sanitary sewage facilities per single family unit, county i, year j. |
| $SFUCW_{ij}$ | = | Cost for water facility system per single family unit, county i, year j. |
| $PCADM_{ij}$ | = | Per capita rate for administrative facilities, county i, year j. |
| $PCHLTH_{ij}$ | = | Per capita rate for health care facilities, county i, year j. |
| $PCFRE_{ij}$ | = | Per capita rate for fire protection facilities, county i, year j. |
| $PCPOL_{ij}$ | = | Per capita rate for police facilities, county i, year j. |
| $PCLIB_{ij}$ | = | Per capit rate for library facilities, county i, year j. |
| $PUP_{ij}$ | = | Total pupil in-migration, county i, year j. |
| $NRSS_{ij}$ | = | Nonresidential sanitary sewage costs, county i, year j. |
| $NRWTR_{ij}$ | = | Nonresidential water system development costs, county i, year j. |
| $RSS_{ij}$ | = | Residential sanitary sewage costs, county i, year j. |
| $RWTR_{ij}$ | = | Residential water system development costs, county i, year j. |
| $SFPUP_{ij}$ | = | Square footage requirements, per pupil, county i, year j. |
| $SWSS_{ij}$ | = | System-wide development cost for sanitary sewage facilities, county i, year j. |
| $SWWTR_{ij}$ | = | System-wide development cost for water system development, county i, year j. |
| $TOTUL_{ij}$ | = | Total utility cost requirements for county i, year j. |
| WEIGHT A | = | Weighting factor of 30 percent to reflect the probability that this amount of the estimated health care facility costs will be provided by public agencies. |

WEIGHT B   =   Estimate of the nonresidential sanitary sewage facility cost as a percentage of the residential cost - 40 percent.

WEIGHT C   =   Estimate of the nonresidential water system development cost as a percentage of the residential cost - 20 percent.

WEIGHT D   =   Estimate of the system-wide sanitary sewage development cost as a percentage of total residential and nonresidential cost - 40 percent.

WEIGHT E   =   Estimate of the system-wide water sytsem development cost as a percentage of total residential and nonresidential cost -20 percent.

Table 4.1.  Rates used in calculating the local government
capital expenditures requirements (1978 dollars).

| PUBLIC UTILITIES | |
|---|---|
| Police | Population living in communities x $48. per capita |
| Fire | Population living in communities x $39. per capita |
| Government Admin. | Population living in communities x $24. per capita |
| Health Care | Population living in communities x $286 per capita |
| Libraries | Population living in communities x $50. per capita |
| **STREET SYSTEM** | |
| Arterials | Street length x $45. per linear feet |
| Collectors | Street length x $35. per linear feet |
| Minor Streets | Street length x $25. per linear feet |
| **UTILITY** | |
| **Residential** | |
| Sanitary/Sewerage | Single Family Units x $1,000 per unit |
| | Multiple Family Units x $400 per unit |
| | Mobile Homes x $600 per unit |
| Water | Single Family Units x $650 per unit |
| | Multiple Family Units x $260 per unit |
| | Mobile Homes x $390 per unit |
| **Non-Residential** | |
| Sanitary/Sewerage | Residential Sanitary/Sewerage Costs x .40 |
| Water | Residential Water Costs x .20 |
| **System Wide** | |
| Sanitary/Sewerage | Residential Plus Non-Residential Sanitary/Sewerage Costs x .40 |
| Water | Residential plus non-residential water costs x .20 |
| **SCHOOLS** | |
| Facility Development Costs | Pupils x 98 square feet per pupil x $47. per ft.$^2$ |

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